
Combining perfluorocarbon and superparamagnetic iron-oxide cell labeling for improved and expanded applications of cellular MRI.

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Authors: T Kevin Hitchens, Li Liu, Lesley M Foley, Virgil Simplaceanu, Eric T Ahrens, Chien Ho

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Public Summary:

PURPOSE: The ability to detect the migration of cells in living organisms is fundamental in understanding biological processes and important for the development of novel cell-based therapies to treat disease. MRI can be used to detect the migration of cells labeled with superparamagnetic iron-oxide (SPIO) or perfluorocarbon (PFC) agents. In this study, we explored combining these two cell-labeling approaches to overcome current limitations and enable new applications for cellular MRI. **METHODS:** We characterized 19 F-NMR relaxation properties of PFC-labeled cells in the presence of SPIO and imaged cells both ex vivo and in vivo in a rodent inflammation model to demonstrate selective visualization of cell populations. **RESULTS:** We show that with UTE3D, RARE, and FLASH 19 F images one can uniquely identify PFC-labeled cells, colocalized PFC- and SPIO-labeled cells, and PFC/SPIO-colabeled cells. **CONCLUSION:** This new methodology has the ability to improve and expand applications of MRI cell tracking. Combining PFC and SPIO strategies can potentially provide a method to quench PFC signal transferred from dead cells to macrophages, thereby eliminating false positives. In addition, combining these techniques could also be used to track two cell types simultaneously and probe cell-cell proximity in vivo with MRI. Magn Reson Med, 2014. (c) 2014 Wiley Periodicals, Inc.

Scientific Abstract:

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